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Research has indicated that one significant deficiency in the intellectual capabilities of disadvantaged children is a disability in abstract thinking. Although all very young children lack this ability, the environment of the middle class child provides an opportunity so that as this child matures, the ability to think in abstract terms naturally develops. The environment of the disadvantaged child does not provide adequate opportunities for the development of this ability. In response to this need of disadvantaged children, a tutorial program was created with the goal of fostering abstract thinking. The program occupies only some 15 to 20 minutes of a nursery school day, but, as it is tutorial, it is effective because of the one-to-one teacher-pupil ratio. The teaching techniques to be used in this program include (1) techniques for the development of cognitively directed perception, (2) techniques to facilitate the child's use and understanding of language, and (3) techniques to focus the child on developing problem solving skills. The several specific techniques within each of the above three broad topical areas are also delineated in the text of the paper. (WD)

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A Methodology for Fostering Abstract Thinking in Deprived Children

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Introduction

The disadvantaged child is heir to a variety of learning difficulties. However, our research has indicated that the central limitation in these children is a deficiency in abstract thinking; i.e., they lack an internal symbolic system by which to organize and codify their world. Although any very young, normal child lacks this system, opportunities for its development are provided in the "typical" middle class environment. As a result the immature thinking of the young child "naturally" matures with no apparent effort. In the case of the disadvantaged child, these opportunities are not available and the deficiencies in abstract thinking become entrenched. Thus, the disparity between the middle class and lower class child increases with age resulting in what has been termed a cumulative deficit.

If the analysis of a deficiency in abstract thinking is correct, it has significant implications not only for the content of teaching, but also for the structure in which the teaching is done. Symbolic thinking is an internalized system which need have no outward manifestation. Therefore, the typical group setting of the nursery school offers a ready smokescreen for those children who are handicapped in their cognitive functioning. For example, a teacher may offer a concept-oriented task such as "The boys should put away the large blocks and the girls must put away the small blocks." The child who does not comprehend, can still perform correctly by imitating the action of the other children, or by following some gesture made by the teacher.

Even when a deficit has been detected, the group situation severely limits the efficacy of its treatment. In the above example, the child at least had to make a response; in many instances in the group setting, no overt response is required. Nevertheless, for learning to occur, the child must constantly make appropriate internal responses (e.g., answering questions, coding the information, changing set, following commands, questioning when material is unclear, etc.). If these inner responses are not made, the teaching, no matter how well organized, is lost. The group situation therefore, not only limits the diagnosis of a deficiency but it places severe constraints on the efficacy of its treatment. By contrast, the one-to-one situation can be tailor-made to overcome these obstacles. Accordingly a program of individual teaching was designed with the goal of fostering abstract thinking to the point where the child could cope with cognitive material offered in the group. The teaching was done daily, but occupied only a small part of the school day (i.e., about 15-20 minutes per session). This procedure was dictated by the short attention spans of young children and the effectiveness of brief but frequent practice of new skills. The section that follows presents the major techniques that have been developed for this tutorial program.

Teaching Techniques

1. Development of Cognitively Directed Perception

Our research (Blank & Bridger, 1966, 1967) has indicated that deprived children do not lack perceptual experience or perceptual skills, but rather lack the means for making these observations meaningful. A number of techniques were devised to cope with the variety of factors responsible for this failure.

a. Selective attention. Disadvantaged children are drawn almost solely to stimuli which have potent perceptual qualities (e.g., blast of a horn, a whirling disc, etc.). Other less exciting stimuli tend to recede into an amorphous background because the child lacks the internal guidelines by which to discern their significance. This results in a seeming perceptual failure. The recognition of the significant perceptual features was fostered by requiring the child to compare objects and make choices among them (e.g., if given a group of differently colored blocks, he was asked to give "two red blocks and one green block"). In this example of selective attention, the higher level concept of number helps the child restrain his impulse to respond primitively to the sensory impact of color alone. Other concepts such as size, same-different, shape, etc. might be used in a similar manner. Contrast was often used to foster selective attention since almost all perceptual characteristics are more salient when viewed in a comparative manner e.g., the flowers of a plant stand out much more clearly when contrasted with a flowerless plant.

A further step is to lead the child to interiorize his new knowledge so that he can evaluate any new perceptual information against an established system, e.g., if a child in one lesson has been shown ivy, in a subsequent lesson he might be shown geraniums and asked "Are these plants the same as the ones we saw yesterday?" If he has difficulty, he can be led to focus his observation by specific questions such as "Did the ivy have red flowers? Did the leaves feel as soft as these? etc." The material from the original lesson, though out of sight, must always be kept available so that it may be brought in for corroboration.

b. Reduction of visual dominance. Visual stimuli are particularly dominated by "perceptual magnetism" with the result that many non-visual stimuli are experienced without awareness. For example, a child may feel pieces of sponge and velvet many times and yet be unaware that these are different textures. The attraction to visual stimuli would seemingly enhance at least visual learning. It actually functions to the contrary since visual stimuli accentuate the impulsivity of the child (Blank & Altman, in press). To facilitate perceptual learning, we devised a series of tasks to diminish the magnetism of the visual sphere. These included the following: 1) the child might be asked to focus on the sound and touch properties of objects, without any visual cues (e.g., to identify which sounded louder, shaking of feathers or shaking of beans; similarly which felt rougher, sandpaper or tinfoil). 2) These tasks could be made more complex by not presenting any sensory stimulus and asking the child verbally to make a decision as to how other objects would sound or feel (e.g., cotton vs. marbles). 3) The child might be required not to respond to a stimulus directly but rather retain it through an image or label (e.g., a picture might be presented and the child might be told that he will have to select it later from a larger group). 4) The child might be asked to select a particular object defined not by its label, but rather by its characteristics (e.g., when I show you the tray, find something on there that will feel soft). After the instructions are given, the objects are displayed and the child must then guide his visual exploration by the previously given information.

c. Reduction of egocentric perspective. The grip of perceptual stimuli can be lessened if the child can achieve a "psychological distance" between himself and the material. The magnetism of perceptual stimuli for young children seems related to the phenomenon of egocentricism described by Piaget. Thus, in the classic

example of the mountain scene the child cannot assume the perspective of another person because he is held in the grip of the stimuli that he experiences.

To help the child achieve the necessary psychological distance between himself and the material a useful technique is role playing. Here the child can experience the opportunities and limitations facing another person by thinking of what that person might say or do and recognizing what the person would not say or do. For example, the child might assume the role of a store-keeper. The teacher might offer aids by having relevant props (e.g., plastic models of food) and asking questions to guide the child (e.g., do you think he would ask for money if someone bought the fruit?). Greater complexity can be introduced by 1) having irrelevant props and pointing out the reason for their irrelevance (e.g., "do you think the storekeeper would care if the fruit came in a blue box or a red box?") and 2) exchanging roles between teacher and child (e.g., the child now becomes the customer).

The aim of this role playing is not to be confused with therapeutic dramatic play. Although the child may work through emotional problems, this would be a by-product of the role exchange just as cognitive gains may be a by-product of dramatic play. However, the major aim is a cognitive one where the child adopts and maintains a set which determines the responses appropriate to his role.

d. Recognition of the significant characteristics of objects and events. Another facet of the concrete mode of functioning is the child's passive acceptance of situations without questioning. This does not refer to the awareness almost any child will show if his immediate needs are not being met (e.g., if he wants to paint and there is no paint brush, almost any child will ask the teacher for help). Rather it refers to the questioning based on an intellectual curiosity - i.e., even when his own needs are not involved, he will be led to question something because it is unusual, new, strange, etc. For example, we have shown children pictures where a child has on one boot and one shoe. Even though they can accurately perceive and describe the footgear, the children feel there is nothing awry in this situation. Questioning thus does not simply refer to verbal expression, but to an internal realization that something should be investigated.

To develop this skill, the child should be led to question the qualities of the commonplace. For example, in trying to show a child why boots are worn in the winter he should recognize that boots are composed of a unique material. To achieve this the child might be told "Look at the boots. Do they feel different from your sneakers?" It is not necessary that the child be able to answer this question. By having the question posed, however, he now is focused on their essential difference. The difference can then be illustrated and clarified by techniques such as putting water on a piece of rubber and a piece of canvas. Similar questions can be raised about other common phenomena such as the difference between things that write and don't write (e.g., a crayon vs. a stick), the decrease in quantity as a material is used (be it crayon, water, food, birthday candle, etc.), the association between shadows and objects, and so on. In order that the child have a framework against which to compare the present experience, it is useful to establish specific expectations regarding each phenomenon, e.g., which do you think will stay dry inside, the boot or the sneaker?

e. Recognition of the tangential from the germane. With the exception of perceptually prominent features the young child sees all elements in a situation as having equal significance. This limitation is frequently evidenced in the child's

recounting of a story where endless minutiae obscure any central theme. In attempting to overcome this, it is helpful to have the child use the motivation of the characters as a means of analyzing a story, e.g., "Why did the bird leave the nest? Why did he stop to speak to all the other animals? Why wouldn't the little girl speak to the crocodile? How did the boy feel when he saw his mother?" By focusing on a main theme the child is helped to separate the tangential from the germane.

In order that the child not limit this approach to specific material such as books, he should be led to focus more discerningly on the relevant features in his own environment (e.g., if on a cold day, he might be asked "Was it necessary to wear a coat today? Would it matter if the coat were red instead of blue? Would it matter if the coat were very thin instead of thick and furry?"). Other examples can then be discussed where color <u>is</u> relevant (as in certain foods such as coffee vs. milk) to help the child discern that relevant properties vary according to the particular objects or situations under consideration.

f. Rationale for observations and behavior. The child's perception, even when accurate, is often limited by a failure to isolate the components responsible for the perception. For example, a child may see a picture of a person crying and say "She's sad." When asked "How do you know she is sad?" the child may possess the necessary labels and yet be unable to give any rationale for his accurate perceptual observation.

This skill, which requires the child to dissect the central features responsible for his observations, lays the groundwork for primitive deduction. To foster this ability, it is useful to focus on properties having some personal relevance since the child frequently observes these very well; specifically, emotional states (sad, happy, worried, and the facial features associated with these), bodily states (cold, warm, hungry, thirsty, etc.), affective qualities (pretty, ugly, nice, etc.). Questions can then be extended beyond the child's immediate person; e.g., weather (snow, rain, windy), seasons of the year and their associated phenomena (leaves falling in the autumn, snow in the winter), job functions (how do you know he's a policeman, a fireman, a nurse, etc.).

g. Awareness of learning: Its components and complexity. A major thesis of the program is that learning is facilitated if the child is not simply the passive recipient of instruction, but rather takes an active role in learning. One means of achieveing this goal is to have the child assume the role of the teacher to another child. The learning of the other child is not pertinent; the central aim is to have the "teaching child" clarify for himself the important factors in the material he is attempting to transmit. This situation is analogous to an adult's learning experience when he is finally able to accurately verbalize an idea which was initially quite hazy in his own mind.

This situation is difficult for the child and the adult teacher must be prepared to offer subtle direction to help the child sustain the teaching for at least a few minutes. Thus the young child should not be expected to deal with open-ended instructions (e.g., "teach him numbers today"). Rather, material with built-in sequences are useful such as asking the child to read a familiar book to another child. Hints can easily be given by the adult teacher and yet the child must use a great many cognitive processes (memory, sequential thinking, elimination of irrelevant information, etc.) if he is to communicate the story to the other child. Other areas for teaching that have an almost built-in elaboration are

teaching songs, setting up of projects with a unifying theme (e.g., "try and get the other child to build a city with these blocks") and teaching a game such as lotto.

2. The Coding Process

The previous set of techniques focused on ways in which to help the child organize his world. The chief means given to him for this organization was language since language offers a code for abstracting and internalizing an almost endless number of properties. Although coding in language has great advantages for abstract thinking, one must recognize that the coding process, itself, requires a high level of abstraction. For example, if the child is to understand increasingly complex language formulations (verb tenses, subordinate clauses, etc.) he must be cognizant of the principles underlying these various forms. Thus, "ed" will be added correctly to the endings of verbs only when the child has some awareness that this form differentiates the past from the present.

Difficulties in comprehending the coding process may in part be responsible for the handicaps associated with bilingualism. The director of a well-known preschool program told me that within her school such difficulties occurred almost solely in the bilingual child from a disadvantaged background. Comparable difficulties were not found in the bilingual child from a middle class background, even when instruction was given through the weaker language. I would like to suggest that multiple languages do not create a problem when a child has a basic understanding of the coding that language represents. Language development may even be enhanced if the child is aware of the fact that different symbols can express the same ideas. If, however, a child does not comprehend the idea of coding, multiple symbols for the same referent merely confuse him. For example "milk" at school is called one word and at home, a different word. Instead of developing a single word for the same liquid, he may begin to think that the same substance changes its identity according to its context. This is the very antithesis of abstract thinking.

The following were among the techniques designed to facilitate the child's coding process.

a) Development of verbal concepts. Although concepts are a vital part of the coding process, certain concepts were emphasized as being fruitful for developing abstract thinking. In particular the type of concepts taught were not those that could be illustrated by simple direct examples or simple labeling. For example, to call an object a "circle" may facilitate communication, but it does not serve to abstract anything more of the object than does a gesture. In addition, the child who can label glibly is often deceptive since his facile use of words gives the false appearance of understanding. In general the types of concepts taught could be grouped in the following manner:

1) Physical properties such as number, speed, direction, temperature, emotions. The teaching of these concepts was always done through numerous graphic illustrations. In addition, physical examples in which the concept did not appear were utilized for contrast. The labels for these contrasting items, however, were given only in the negative form; e.g., rather than say, this is a cup and this is a spoon, we would say "this is a cup, this is not a cup." The simultaneous teaching of two or more labels was avoided because of the child's tendency to associative learning. Thus, if the labels fork, spoon and napkin were taught

together, the child would see them as interchangeable labels for this set of stimuli rather than as autonomous descriptions of independent items. Similarly, the same rationale prevails in the teaching of polars. Thus, up would be taught in contrast to not up rather than to down.

The above is not to be interpreted to mean that categorization was not part of the program. Elementary categories such as food, clothing, transportation, and job functions were taught. However, each new member of a category was introduced individually in the manner outlined above. Techniques for teaching these concepts and categories are well documented by Bereiter and Engelmann (1966).

2) Multiple concepts. The aim is to help the child's capacity to handle several concepts simultaneously e.g., color, size and direction as in a command such as, "draw a long red line next to the small blue circle."

3) Temporal concepts. Studies in our laboratory revealed that purely temporal stimuli could not be discriminated unless coded in a language system (e.g., a sequence of auditory stimuli such as taps of a pencil) (Blank & Bridger, 1964, 1966). These observations are in accord with Whorf's (1956) observation that in the mechanistic thinking of European languages,time is objectified by treating it as if it possessed spatial qualities (e.g., length of time, number of days, etc.). Therefore, temporal stimuli afford an excellent situation for both training children in language based concepts and in presenting situations in which language is essential for the concept to be developed.

4) Linkage concepts. Establishing the connection between interdependent objects or actions e.g., eyes and seeing, sadness and tears, wheels and movement, key and a lock, etc. It is important to demonstrate when linkages are appropriate (e.g., if water is steaming it must be hot) and when linkages are not appropriate (e.g., the color of the water may not tell you anything about how it will taste.

5) Definition through function. As cited above, simple labeling does not require much abstraction. Therefore, increased practice in this area may enlarge vocabulary, without augmenting cognitive skill. Labeling can be placed in the hierarchy of abstraction through techniques such as defining an object by its attribute or function (e.g., if the teacher wants to foster the idea of "bed" rather than saying "look at the bed" she can say "What thing would you lie down on if you were tired?").

b) Categories of exclusion. In our program, abstract thinking was viewed as a style of functioning in which mental skill and effort are independently brought forth by the person. Once a mental skill is firmly established, it may be a useful part of an individual's adaptive repertoire but it no longer requires great mental effort; ergo, it no longer is abstract thinking. For example, if you ask a young child who is just learning the concept of size to give you a "large block", he must put forth cognitive effort to complete the task. Once the concept of "large" is well established, the child no longer needs to reflect upon the word to fulfill the demand. The seemingly abstract word "large" is now as easy for him as a simple perceptual task. Thus, concepts by themselves, no matter how numerous, need not demand abstract thinking: if abstraction is to be achieved, the teaching of concepts must be structured so as to stimulate the child's mental level. This was done by having the desired concept defined not by its presence, but by its relationship to a set of stimuli. For example, the child might be asked to draw something and he might draw a circle. To encourage the development of exclusion, he would then be asked to draw "something other than a circle". It should be noted that the specific object labeled in this command

defines what should not be done. Therefore the child must overcome his almost compelling urge to respond only to key words ("circle" - "okay I'll draw a circle.") and instead reflect and independently determine a concept appropriate in this frame of reference. This technique can be applied to objects ("get me something to write with other than a crayon"), actions ("how else could you reach the door without walking?"), or attributes ("give me something that doesn't feel heavy"). Since categories of exclusion are defined not simply by nouns, but also by adverbs and prepositions (without, other than, not, else, etc.), this technique gives the child training in attending to quite complex syntactical structures.

c) Relation of the word to its referent. If the child is to grasp the dynamics of the labeling process, he must both 1) see the way in which the word becomes associated with its referent as well as 2) comprehend the distinction between the word and its referent.

1) Fusion of the word and its referent. Because of the profusion of labels, the process of labeling seems arbitrary to the child. Some order can be brought to this endless array if the child can be shown that this can be a logical process. For example, things to do with teeth usually have that word in the label such as tooth paste, tooth brush, tooth ache, etc. Similarly floor wax, floor polish, floor mop, etc. Two useful techniques for developing analysis of labeling are a) compound words and b) analogous use of words. With regard to the former, the child can be taught to dissect compound words into their component parts. Relevant words for the pre-school child might be shopping-bag, shoe-lace, stomach-ache, eye-glasses, lip-stick, button-hole, etc. Thus, he might be asked questions such as "Why do you think this is called a shoe lace and not a glove lace?" or "If polish on the floor is called floor polish and polish on shoes is called shoe polish, what do you think polish on finger nails might be called?" With regard to the analogous use of words, it is useful to show a child how the referent to a word remains stable even though the setting differs. Parts of objects are given the same label as parts of a body because of similar function or structure e.g., wings of a plane, eye of a needle, tongue of a shoe, legs of a table, skin of a fruit, etc. To achieve this comprehension, the child might be asked "What is alike about the legs of a desk and the legs of a person?" If he cannot answer, he might be helped with questions such as "What part of your body do you stand on?" and "What part of the desk does the desk stand on?" etc.

2) Separation of the word from its referent. If the child is to learn to identify the essence of the meaning of a word, he must be taught that the word exists independently of the object or action represented. This is important because young children respond automatically to key words in a sentence and do not recognize that the words are autonomous (the words "go to the door" are treated like the actual execution of the act. If this separation is not achieved, the child will have difficulty in generalizing the meaning of words beyond the particular contexts in which he hears them. For example, I observed a bright five year old child who had just been shown how to make the symbol "2". She turned to the teacher and said, "How much is two and two?" to which the teacher responded by holding up two fingers on each hand and indicating that the child should count them. The child looked at her in a confused way and said "I don't mean that "two" (two fingers); I mean this "two" (the written symbol 2). Although the child had previously seen endless examples of two, all the prior instances had, in fact, contained two separate units (two eggs, two pins, two apples). In this new situation, the child was required to recognize that a single unit (the symbol "2") was equivalent to

these dual units. Her understandable difficulty indicated that she had not abstracted the meaning of the word "two" beyond her particular experiences.

This separation of the symbol from its referent becomes crucial in understanding all written symbols since they bear little physical similarity to the objects they represent. Before the written level is attempted the child must gain an appreciation of the meaning of the spoken words as independent of the context in which they appear. To help the child recognize that words have meaning, he might be asked to speak rather than sing the words of a song he knows well. It is common for young children to sing songs quite well and yet not realize that the things they are singing are words. Another useful technique is to give the child a command which he must repeat aloud before acting out the command. For example, "jump up two times", "walk to the door and open it". In addition to asking the child to describe what he is about to do, the child may similarly be asked to describe what he has just done e.g., the child may be told to get two crayons and put them on the table. He may then be asked to describe this sequential action. It should be noted that these techniques not only take sets of words out of their usual context but also serve to control impulsivity. The experience of children when required to pause over material is analogous to the experience of an adult when he suddenly realizes that the components of certain words have a meaning in their own right (sky-scraper, fear-less, rail-road, high-way, suit-case, etc.).

d) Relevant inner verbalization. We have found that many deprived children will use language to direct their problem solving only when asked to; they will not spontaneously use language when these external requirements are not imposed (Gotkin et al). Thus, internal language is often more seriously deficient than external language performance would indicate. One means for training the child to develop inner verbalization is to have him use language silently and then express it upon request. For example, he might be asked to look at a picture, say the name to himself, and then after the picture is removed, tell the name to the teacher. Another useful technique is to have the child retain a sequence of words (whether a sentence, a series of labels, a set of number and letters, etc.) without being given any other specific instructions. After he indicates that he has coded the words, he can then be asked to perform a variety of operations on them (e.g., say it backwards, say every other word, pick out the words in the sentence that are also present as objects in the room, etc.). To complete the particular demand confronting him, the child must constantly revert to his initial coding and internally manipulate the various symbols.

It is also extremely useful to give multiple commands. Unlike single commands which can be executed without reflection, multiple commands tax memory and thus impel the child to resort to inner verbalization.

Inner verbalization is also integral to the child's ability to plan independently. Thus, even when no adult supervision is available, he can maintain a course of action if he so desires. One means of achieving this is to have the child freely state what he would like to do; the course of action that he executes should be relevant to the words he himself has chosen. This is to dramatize to the child that words can represent reality. This is in opposition to his tendency to see words as arbitrary accompaniments to behavior. For example, if the child wants to play with blocks he might be asked "What are you going to make?" If he says a "garage", he must then carry through on this theme. If he does not complete the garage, he might be aided with questions such as "What did you say you were going to make? Does that look like a garage?" "You said you were making a

garage. Why did you put beds inside it?"

e) Development of a coding or translation process. Non-verbal coding skills were also fostered with the goal of obtaining transfer to the verbal language system. It was hoped that the child would thereby get an insight into coding by seeing the coding process in a new light. This is analogous to the greater appreciation for the grammar of one's mother tongue when one learns a foreign language e.g., because of endless previous training one never thinks that adjectives precede nouns (a phrase like "day fine" just "instinctively" sounds incorrect) until one learns a foreign language where adjectives follow nouns.

The tasks that are outlined below partake of "nonverbalized" forms of representation such as gestures. We are not concerned with determining whether such representation is "true" language. For example, the gestural symbols of the deaf may or may not be as advantageous as the vocal words of the hearing. Nevertheless, it was felt that they require many of the same coding skills as does vocal language and therefore they would be advantageous for focusing the child on the coding process.

One useful representational skill is map drawing. For example, one might begin at an elementary level where a child can be asked to draw familiar objects keeping in mind the size proportions involved (e.g., "draw a house with a door and have a person standing in front of it." Then, by focusing himself in relationship to a door he can be led to discern whether, in his drawing, the size of the person is appropriate relative to the size of the door.). More complex types of map drawing can then be attempted such as schematically depicting the room almost as in a blueprint as contrasted to realistically picturing particular objects e.g., a circle can stand for a chair, a rectangle for a table, etc. An advanced step would be to have the child attempt schematic drawings of large areas such as the floor plan of his house, the neighborhood, etc. Here the child can never have a single image of the totality as in the case of a circumscribed place. Rather, he must independently bring together a number of disparate images and relate them so as to form a coherent whole (e.g., "Green Street goes the same way as Columbus Avenue, but I have to join them by Third Street.").

Games such as Charades are also useful in teaching a coding system. The child must decide upon the salient characteristics of an idea (The Cat in the Hat) and then translate his verbal knowledge to a motor representation. The child who observes the dramatization gets practice in the reverse process of translating motor actions into the verbal sphere. A more sophisticated version of Charades can also be played where pictures represent a word or parts of words. Thus, a sentence like "the boy needs a football" can be shown by a picture of a boy, a picture of a knee followed by the letter d, and then a picture of a foot and a ball. This type of game also helps to give the child an appreciation of the fact that words have components which can have meanings in and of themselves.

f) Awareness of possessing language. Because the language deficiencies of the deprived child are so apparent, it often goes unnoticed that he even lacks an awareness that he possesses the skill of language. For example, even when a child has correctly executed a series of commands, e.g., as in drawing ("make a square, color in the top half of the square, make something that is <u>not</u> a square," etc.) he is often at a complete loss when the teacher tells him "Now you ask me to draw something." Here again, just as in categories of exclusion, he is not required to respond directly to a specific statement (e.g., draw a circle); instead, he must

independently select an appropriate response from an open field in which the specifics have not been defined (e.g., the only restriction is that it must be something that can be drawn).

One of the most effective ways for overcoming this deficiency is to utilize opportunities where the child can verbally define a course of action for someone else (e.g., now tell me what the doll should do this afternoon?, what do you think I should ask Joey to do?, what shall we make with the blocks?). It is best to avoid questions which easily elicit cliched answers (e.g., if the child is asked "What could the teacher say to the class?" - the child can easily say things he has heard an endless number of times such as "Stand in line, sit down for your juice, dress to go home."). Similarly, if the child in giving a command, merely imitates a command he has just heard (e.g., after being told to draw a circle, he now tells the teacher to draw a circle), his statement should not be accepted as sufficient. It would be best to accept his statement and <u>then</u> say "Now think of something <u>else</u> for me to draw."

3. Problem Solving Abilities.

The first two series of techniques indicated ways for the child to become aware of the intricacies and flexibility of a coding system and to look to this coding system to guide his perception of the world. In all these techniques, the child was confronted with a <u>problem situation</u> in which language had to be understood and/or used for the task to be accomplished correctly. Since the focus was on language acquisition the problem solving element played a relatively small role. Problem solving skills, however, are a vital part of abstract thinking, and therefore another set of techniques was designed to focus the child on this important aspect of abstract thinking.

a) Development of memory.

For the disadvantaged child memory often consists of sporadic details inserted in a seemingly random fashion. If the child's memory remains undisciplined he cannot draw upon previously stored information and thus he is lost for problem solving. Memory here does not refer to specific deficiencies such as blocking on names, but rather to the overall ability to internalize material into a meaningful system. A variety of tasks can be developed to facilitate memory, such as:
1) giving a series of commands that must be retained before they can be acted upon (e.g., pull the chair to the desk, stand up on the desk, and take down the picture)
2) display a series of objects, remove one or more without the child seeing them and then ask the child to name the missing objects
3) reviewing concepts and events that have occurred in the session (e.g., what happened to the water when we put blue and yellow together?)
4) as the child's memory develops, reviewing material in previous sessions (e.g., do you remember what toy we used yesterday?).
In testing memory over extended periods of time, it is important to keep the relevant items available so that the demands can be reduced where necessary (e.g., in discussing the toys used on the previous day, if the child cannot succeed on his own, the teacher might select three toys and say "Was it any of these?"
5) helping the child select from the past to enable him to generalize to the present (e.g., if the lesson is concerned with demonstrating how spaghetti gets soft when cooked, the teacher may help the child predict this outcome by saying

"Do you remember what happened yesterday to the potato when we cooked it?"

b) Models for cause and effect reasoning.

Even when a child is aware of common features in his environment he frequently sees them as existing in a vacuum with no relation to other significant events. The child must be taught to relate these seemingly discrete events; this development is a necessary, elementary step in cause and effect thinking. With any new skill it is important to reduce other cognitive demands, so that the child is focused on the new skill alone. For example, in the technique of cause and effect reasoning the child should not be required to image the details but rather have all the concrete illustrations directly at hand. Thus, if the child has on long sleeves and is playing with water, he might be asked "What can you do so that your sleeves stay dry?" Here all the factors are present - the sleeves, the water, the contact with the water, etc. The single demand placed on him is that he unite these disparate items and relate them serially so as to effect a change appropriate to the demands of the teacher. Only after sufficient training might the child be asked to effect changes in imagined or previously experienced situations. Thus, in the example above, the child might be wearing short sleeves and be asked "If you had long sleeves on, what could you do so they wouldn't get wet?"

Other means of extending the child's skill in this area is to have him draw upon his previous experience to determine the rationale associated with his observations (e.g., on a rainy day he might be asked, "Why can't we go out and play? Why do people carry umbrellas? Why doesn't it rain inside the house?"). Similar examples of cause and effect reasoning are why the fire bell rings, why one gathers several separate items in a single shopping bag, the purpose of cooking some foods and not others. It is important in discussing such commonplace items, to guard against accepting simple, rote responses without further exploration from the child.

In addition, the child can be shown the results of a course of action so that he can realize how changes are effected (e.g., if your eyes are closed, you will not see anything; if you stand on one leg, you cannot walk normally). It is also useful to show that the results of certain actions can be reversed (e.g., open your eyes and see again) while the results of other actions are (for his purposes) not reversible (e.g., the ingredients of a cake cannot be brought back to their original identities). In this regard, transformation of material (cutting, mixing, diluting, etc.) is extremely useful for demonstrating the changes that may be effected in situations. This is vital in enabling the child to sever the ties to the concrete so that an object can be viewed in all its manifestations (e.g., a cake as batter, crumbs, slices, layers, etc.).

This technique of cause and effect reasoning is related to, but not identical with a technique cited earlier - namely, rationale for observations. Put simply, the latter is more concerned with knowing how to identify and isolate key features in a situation whereas the former is more concerned with questions that will effect or did effect a change in a situation.

c) Imagery of future events.

Critical to cause and effect reasoning is the ability to image the outcome of an action, thus avoiding undirected trial and error. Imaging of events is also essential to reconstructing past experiences. Piaget states that rudimentary imaging is present by the end of the sensorimotor period, e.g., if presented with

a form board, the child may compare the objects to their respective openings without actually completing the action. However, such imagery is bound to situations immediately confronting the child. If internal representation is to adequately serve abstract thinking, the child must be able to deal with situations which are removed in both time and space from his immediate experience.

To develop this capacity, the child can be required to think through the results of realistically possible, but not present courses of action. For example, he might first be asked to locate a doll which is on the table. After he completes this correctly, he might be asked "Where would the doll be if it fell from the table?". The complexity of the situation can be increased by having the child consider a problem with a number of relevant parameters (e.g., if I had a glass, a doll and a ball on the table, what do you think would happen to each one if it fell off the table?).

d) Validation of verbal statements.

Because much adult conversation with children is stereotyped (e.g., How old are you? Where do you live? What do you like to do?), children learn to give appropriate verbal responses, without necessarily understanding the meaning of the words (just as adults, without thinking, say "Fine" when asked "How are you?"). The lack of understanding becomes evident when the child confronts a situation where a cliched response is inadequate. For example, when asked "Why do you use chalk on the blackboard?" one four year old said "To make you big and strong." (an answer which served many "Why" questions.) The irrelevancy of the verbalization may be both charming and insignificant in this particular problem. If this behavior goes untreated, however, the child runs the risk of being at a total loss when confronted with problems (e.g., mathematical problems), where language is crucial for solution.

A useful technique for establishing this set is to make the child test the validity of both his own statements and those of the teacher. For example, a child might be asked "How many fingers do you have on one hand?". Whether his answer is right or wrong, he is made to test, by counting, whether his verbalization was correct. Such questioning also helps to overcome children's common misconception that they are questioned only if their answers are wrong. The above example referred to an immediately verifiable statement. The technique can be extended over time for verification of predictive statements, e.g., if I put the water in the refrigerator for a long time, how will it feel when I take it out? The predictive outcome (requiring other high level skills) can then be validated to show the child the appropriateness of his verbal solution. Similarly the child can be required to verify events that have occurred in the past; for example, he can be asked questions about a story he just heard (e.g., what color was the car, what did the mother say to the boy, etc.).

The child can also be led to validate the teacher's statements (e.g., the teacher can say that she thinks the radiator is hot and the child can be asked to check this). Aside from the value of teaching the child that authority need not be accepted automatically, such questioning requires that the child be attuned to the teacher's frame of reference. This "tuning in" is basic to developing the receptive aspect of verbal communication.

e) Recognition of the incorrect.

Validation of verbal statements requires that the child recognize a correct from an incorrect solution. Yet a feature, common to children deficient in

abstraction, is their failure to entertain the idea that there is a right or wrong in any given situation. This may be in part responsible for young children's difficulties in recognizing transparent absurdities. For example, we have said to children who can identify all the body parts "Close your eyes. I want to see what color they are." They unquestioningly do as they are asked because they have not analyzed the implausibility of the sentence. They see all the details clearly but any juxtaposition is as logical as any other.

When we speak of correctness we do not of course refer to punishable behavior; even young children know which situations will result in their being punished. Rather, correctness refers to the recognition of what is appropriate to a situation. For example, in a lesson on temperature a child who knew the word "hot" was asked to touch a warm stove. She immediately withdrew her hand, obviously discomforted. When asked how the stove felt she said "fine". This answer had been learned as a rote response to questions such as "How are you?" and "How do you feel?". Even if this question had been misinterpreted by the child as "How do you feel?", it is significant that she did not recognize the inappropriateness of such a question in this context.

To develop the recognition that responses must be germane to the problem at hand, the child can be asked to judge what is best suited for a particular situation (is it better to eat soup with a fork or spoon? if you're tired, is it better to sleep or eat?). He might also be asked to justify why something is not appropriate (if we want to play with the ball, why shouldn't we put it away in the closet?, if we want to use three blocks, why shouldn't we take out just two blocks?, if we want to drink the cocoa, why shouldn't we pour it down the sink?).

f) Flexibility in thinking.

When a child is taught to recognize the relevant (correct) from the irrelevant (incorrect), it is important to guard against his thinking that there is only <u>one</u> appropriate response in any situation. Flexibility in thinking entails a recognition that appropriate responses cover a range of possibilities; some nearer to the mark than others. To achieve this goal, a child might be asked how to keep up his overalls when he had lost a button. He might suggest sewing it back on; the teacher can then ask "What else could we use if we have no needle and thread here?" If he can't answer, he might be shown a range of objects such as a scotch tape, a safety pin, and a rubber band. The inappropriate articles could also be discussed from the standpoint of which would serve <u>least</u> well.

Flexibility in thinking can also be facilitated through demonstrating to the child that the same solution can be used in different problems. For example, the child can be shown that the step ladder used to reach the sink can also be used to reach a high shelf.

A third variant of flexibility is to have an object function for multiple purposes. For example, a table used for eating can also be covered and used as a tent; water used for drinking can also be used for cooking; a string used for tying objects can also be used as a shoelace.

g) Selection of alternatives.

Many of the techniques (e.g., flexibility and recognition of the incorrect) require the child to compare responses of varying degrees of appropriateness. Often, however, the question of alternatives does not even arise since the child cannot think of any answer at all. When a child has difficulty in answering a problem, a useful, simplifying technique is to offer him a choice of several

alternatives - one of which is obviously correct. However, the use of alternatives can be an end in itself since the child's thinking becomes much freer with the awareness that alternatives even exist. For example, a child may be asked "If you were hungry and in school, whom would it be best to ask for food; a friend, your mother or a teacher?" The child must then justify whatever response he gives - with the teacher guiding the questioning to help the child understand which is the most appropriate choice, e.g., if the child says "My mother", the teacher can say "Is your mother here to give you food in school?". Variations of the same question can then be asked, "If you were hungry and at home...." to enable the child see that the solution varies according to the particular circumstances that are posed.

h) Development of sequential ordering.

A technique such as selection of alternatives requires that the child successively compare a series of ideas relevant to the problem at hand. Yet a limitation of the thinking of young children is their difficulty in analyzing the portions of a whole. The total situation is accepted without examination of its relevant parts.

For example, if a child is asked to find a word that is missing in a sentence such as "I go to every morning", he has great difficulty in ascertaining where the missing word is and what it could be. The young child may not even notice that a word is missing since he frequently accepts language that has no meaning. By contrast, it is relatively easy to supply the same word if it comes at the end of a sentence "Every morning I go to". In this example, one simply follows the sequence and almost "automatically" offers the word that will complete it to form a Gestalt. In the former example, the sequence must be dissected and reflected upon if you are to recognize that a word is missing and then determine what the missing word might be. The ability to analyze material in this way is an essential step in sequential, logical thinking.

To achieve this skill, it is useful to use concepts which in themselves are sequential such as shading, height, number, and duration. For example, a series of sticks of different lengths can be displayed and the child must order them. He may also be asked to locate where in the sequence a part might be either missing or out of order, relative to the others.

Visual materials which involve a succession of ideas rather than a single concept, e.g., picture sequences, can be used to extend the idea of sequential ordering. For example, the child may be shown a series of pictures in which a child is pouring milk into a glass, drinking the milk, and then an almost empty glass. He may first be asked to put these in order. Later on, possibly on different material, a picture might be omitted from the sequence and no spacing would be presented between the remaining pictures. The child would be asked to find where the missing picture should go and what it might contain. If he needed help, the teacher might have to indicate where the missing picture might go by appropriately separating the pictures that are already in front of the child. This would reduce the complexity yet not fully solve the problem for the child.

Comparable tasks could be developed for auditory word skills by giving sentences such as "I saw in the sky" and "The tells time." If the child cannot solve these, the teacher may pause at the point where the word is missing. Training in different parts of speech can also be given in this way (e.g., having a child fill in a series of sentences where adjectives are omitted, another series where prepositions are omitted, etc.).

i) Development of problem solving strategy.

Earlier it was pointed out that young children experience difficulties in recognizing that a problem exists. Many times, particularly if the problem represents an obstacle to need gratification, recognition of the problem is obvious. For example, if a child wants a bar of candy that is out of reach, he is aware of not being able to obtain the desired object. The difficulty here is not in problem recognition, but in problem solution. Sometimes problem solution can be easily achieved without the need for higher level thinking; e.g., the child might imitate commonly seen behavior (in the example of the candy, he might stand on a nearby chair).

When these simpler solutions are not sufficient, however, the child must be able to pause and reflect upon alternative courses of action. Because the young child often lacks the necessary skills required for this type of problem analysis, he frequently resorts to impulsive trial and error or withdraws in frustration. To overcome this deficiency, the child must be made aware that alternative courses of action exist.

For example, a child may be asked "If I gave you two boxes - one with marbles and one with feathers, what would you do to find out which material was in which box." If the child gives the verbal solution such as "I would look inside", he might then be asked "Fine, but what would you do if they were in covered boxes which you couldn't open?" Other restrictions might be established such as "If you could lift only one, how could you tell what was in the other?" This is an advanced technique which cannot be attempted until other skills are well grounded (imagery, flexibility, deductive reasoning, non-visual modalities, etc.). Since the young child is drawn to sensori-motor cues if they are available, it is often best to require him to work through a hypothesized problem where initially no perceptual props are offered. Through this method the child will not have to repress his natural bent towards the physical since the physical will not be there to attract him.

j) Deductive and inductive reasoning.

Much has been written about the need to develop the powers of observation of young children if they are to succeed in academic skills such as reading and writing. It is possible, however, to develop quite sophisticated perceptual abilities and yet still be bound to a concrete level of thinking. For example, a child in playing with red and white paints may achieve clear examples of pink and be able to apply appropriate labels to all these colors. If the teacher asks "What do you think will happen if I put white on black paint?" the child may be at a total loss as to how to grapple with this problem since he sees no elements in common with the situation he just experienced. His failure is not due to a language deficit in the sense of lacking the appropriate words, nor is it an experiential deficit since he has had many contacts with the paints. He fails because he does not reflect upon the implications of the actions he himself just performed and observed.

In this example what was required of the child was the dual process of deduction and induction. The child had to move beyond the concrete observable experience, make a generalization (if I add white to other colors, it gets lighter), and use this generalization to make a new deduction (therefore the black should turn lighter). Even in tasks which seem to require only perceptual skills, the inductive-deductive process may be necessary. For example in reading, a child may see the word "low" for the first time in a sentence such as "The chair was too

low for Goldilocks". His first choice might be to rhyme "low" with words of similar appearance such as "cow" and "now". However, since rhyming will not serve in this situation, the child must deduce that an alternative solution is required.

This type of reasoning requires many skills such as memory, categorization, and most important, elimination of irrelevant or incorrect information. Working toward this goal, a game might be played in which the child would be asked "I am round and red and can be eaten, what am I?". He must think or be helped to think of the possibilities that have at least some of these characteristics (e.g., a ball, an apple, ketchup). Through a process of elimination, the child must decide which objects fail to have all of the desired characteristics. At a higher level, the child may be led to play games such as Twenty Questions. Here he must both ask the questions in terms of the defining characteristics of properties (e.g., does the animal have four legs? could he live in a house?) and increasingly refine his questions on the basis of information achieved from previous questions (e.g., If it is no longer living and too big for the house, then maybe it is a dinosaur.).

Another useful technique in developing inductive thinking is to have the child determine which characteristic is common to a variety of instances. Properties that define the significant functions of objects are particularly useful. For example, the child might be asked to strike a number of materials, glass vs. felt, metal vs. cotton, beans vs. flour. He can then be led to recognize that in this situation a common denominator such as hardness determines the amount of noise that the item will produce.

k) Ability to employ sustained sequential thinking.

Perceptions, ideas and problems are only the units of abstract thinking; they attain their full meaning not in isolation but rather when they are embedded in context. To be able to see objects, events, and issues as located within their appropriate framework, the child has to be taught to maintain concentration and flexibly shift from one skill to another. Thus, each teaching lesson was designed to encompass a sequence of interrelated events (Blank & Solomon, in press). For example there might be a lesson on ways in which material can be altered. The discussion would begin with vegetable dyes (their function, the appearance, etc.), and the child would have to use skills such as describing salient features, recognizing the tangential from the germane, employing non-visual skills such as touching the liquid, etc. The issues might then be raised as to what can happen to these dyes under various conditions (e.g., diluting them with water, leaving them in concentrated form, etc.). In each case, the child would be required to apply the necessary change (i.e., add the water) so that he could directly and immediately experience the phenomenon being discussed. In this context, skills such as imagery, selection of alternatives, validation of verbalization, etc. must be employed.

In essence, any common phenomenon readily available in the child's life, e.g., time (day, night, morning, etc.), weather (cold, hot, summer), composition of materials and their appearance and function (clay, pencils, crayon, cloth, etc.), the reasons for and results of behavior (eating, sleeping, walking, etc.), can be used as a unit of work for a single lesson or a series of lessons. A vital factor is that the child continually be made aware that any phenomenon does not exist in a vacuum but rather has ramifications which can and should be explored.

1) Ability to sustain independent work.

All the techniques of the program are designed to develop cognitive skills which the child can internalize and use independently. Abstract thinking does not exist if external support must constantly be supplied. This ability to work independently may develop through frequent practice of the aforementioned techniques. However, rather than relying on this incidental emergence, the program was designed specifically to foster independent work. By independent work, I do not mean simply pursuing activities for a long period of time; such pursuit can be fruitless from a cognitive standpoint if the elements of abstract thinking are not clearly incorporated. For example, a child might be given a book and asked to select all the pages with animals on them. The task could then be made more complicated by asking him to mark people with a red crayon and animals with a blue crayon. Depending upon the complexity of the assignment, the task can require increasing concentration, maintenance of a set, categorization, and simultaneous consideration of several elements. This task is not to be confused with busywork such as stacking all the books in a pile since the latter activity, once begun, can be continued by simple rote behavior.

Implications of the Individual Tutorial Method

Many investigators who work with disadvantaged children would draw up a list of intellectual skills similar to the ones just presented. The controversy lies not in the goals but in the method for attaining these goals. Those researchers (Deutsch, 1964) who have been influenced by the concept of total enrichment would feel that deprived children can achieve adequate functioning only if offered a wide range of experiences (e.g., perceptual training, language skills, parent cooperation, trips, enhancement of the self image, etc.). By contrast, the program outlined herein offers a focused, detailed analysis of a limited sphere of behavior.

Other educators would agree that focused programs are an essential ingredient for adaptive functioning in the deprived child. However, they feel that such teaching can be adequately done in the group setting (Bereiter and Engelmann, 1966). I have taken the approach that the group situation makes it extraordinarily difficult to ensure the child's use of cognitive skills. In addition, the group setting rarely allows the teacher to pursue material in as sustained a way as does individual teaching. There are frequent distractions as the interests of each child must be met. Therefore, unless the young child adopts the unlikely course of independently organizing the flow of material, the "discussion" exists for him almost as isolated units and not as part of a continuing inquiry.

Individual tutoring, however, only provides the opportunity for avoiding these difficulties; by itself, it does not guarantee that the child will use the desired cognitive skills. The achievement of this goal depends on the way the teacher structures the session. The techniques outlined here are designed to be used as in a Socratic dialogue. The basis of such a dialogue is questioning; obviously, however, not all questions are equally useful. In trying to determine which questions were to be asked, the following guidelines were used.

- Avoid questions that are so common that they can be answered, or can elicit, rote responses, e.g., How are you today? Do you like school? Do you have a nice

teacher? What would you like to be when you grow up? Such questions are frequent in casual conversation. Just because they are so frequent, however, they elicit answers which require almost no thinking. While rote responses may be a necessary part of many activities (e.g., habits), they are not useful when one specifically attempts to develop the ability to reflect.

2. Avoid questions to which a vast array of answers can be deemed correct e.g., What do you like to do? Where would you like to go today? What television programs do you like? What kind of food do you like best? Occasionally such questions can be put to fruitful cognitive gains; for the most part, however, the child need not attend to the entire question. Rather he can focus on one or two key words and answer the question correctly by giving a simple association to the word he has focused upon (e.g., food-ice cream, TV-Batman).

3. Avoid questions that cannot be verified. The child must gradually learn that a major function of language is to describe the real world. If the child cannot be shown that his answers are adequate representations of real occurrences, this goal cannot be attained. Examples of questions to avoid are, "What did you do last night? What did you eat for breakfast? What time do you wake up? What TV show did you watch? What did you see on your way to school? etc." Nonverifiable questions can often be vital in many situations (e.g., in psychotherapy where the answers, whether or not correct, may give valuable insights into the child's view of his world). In a cognitively directed lesson, however, questions must be verifiable.

Verifiability does not refer to the information the teacher possesses about the child's reality, but rather to what can be shown to the child at the moment when the question arises. Thus, even if the child says that his father is a policeman and the teacher knows this is not so, it is almost valueless to say "No, your daddy is not a policeman." The teacher is unable to prove her verbalization at that moment and so the correct information is valueless to him. When working in this area, it is best to start with relatively short term memory where the event can still be easily demonstrated to the child (e.g., what toy did we just use? What song did we just sing? What did we make out of the blocks today?) and then gradually move further in past activities where aids can be offered to help the child recall (do you remember what we played with yesterday? do you remember what I asked you to do with the clay yesterday? etc.). Much has been written about the importance of expanding the child's opportunities for fantasy and creativity. The tone of this paper, with its emphasis on verifiability and reality, seems to imply restriction of the child's opportunity for this expression. The opposite, however, is true. A firm language-based reality is essential to free the child to differentiate between what indeed is a creation and what is not. Even more important, as he develops a fund of internalized skills, his fantasy life can be increasingly enriched.

4. Where possible, avoid giving direct answers to children's questions. The child often cannot appreciate the information gained from direct answers since he will not have been given any understanding on the operation used to achieve the answer. Therefore, whenever a child's question had the potential for furthering his thinking, he was led to ascertain the answer for himself. For example, if a child asked, "How can I make this building (of blocks) bigger?" we would not say "Add some blocks." but rather "If you want it bigger, should you add some blocks or take some away?". Then regardless of whether his answer was correct, the action

would proceed on the basis of his verbalization to show him that correctness of his responses. Thus, if he said, "Take some away" we would say "Okay, take some off. Is your building bigger or smaller now?"

Sometimes, direct answers should not be avoided. For example, when a child's question shows a major insight in thinking, he both wants and can profit from didactic teaching, e.g., a child may ask, "Why do I have to put the plug in the hole (socket) if I want the radio to play?". This type of question indicates a marked step in thinking since it shows that the child is trying to determine a reason for an event. Direct answers are also necessary in response to questions of fact. For example, if a child asks, "What is glass?" it is often best to show an example of the word. Labeling is basically an association of a word with a thing and does not require and need not benefit from an abstract, deductive approach. The child's ability to grasp this information, however, might be tested by asking him to find another example of the item or think of something that is similar to it. Direct answers also need not be avoided if the information requested is part of children's common conversation and is not central to the lesson, e.g., Do you like my new dress? Can I sit here? etc.

5. Avoid the pitfall of questioning only when the child is wrong. If this pattern is established, the child will know that a question means he must change his answer. Instead, the child must learn that any response can be questioned. In this way he learns both 1. to be able to justify his behavior and 2. to self-test when he is searching for new information. For example, if a child sees a pot on a stove and says "It's hot", regardless of whether it is hot or not, he should be asked a question such as "How can you tell that it is hot?"

6. Avoid repeating the same question several times. If a child cannot answer a question, it is sometimes useful to wait a few moments and repeat it, even if the child says "I don't know." Often he says this because he has not taken a mement to reflect. If, having been given this opportunity, he still fails to respond, it is useful to decrease the demands of the question (e.g., by offering some hint or a simpler question). For example, if the child cannot answer a question such as "Where will the plate go if I drop it?" you might say "Will it go up in the air or down on the floor?" Another example might be "Why do you think the boy in the picture is wearing a raincoat?" If he cannot answer this he might be asked "Well, what kind of weather is likely if he is wearing a raincoat?" Maintaining the questioning at this simpler level rather than directly giving the child the answer helps him learn that even difficult problems can be solved.

The techniques for individual teaching outlined here were applied in a pilot program involving a group of 12 three to four year old children (Blank & Solomon 1968, in press). Thus far, promising results have been obtained and the progress has been dramatic and rapid. Even after only four or five hours of tutoring (about a month) striking gains are apparent in verbalization, control of impulsivity, feelings of mastery, etc. It should be noted that individual attention alone does not account for these gains. In a group of three children given individual, but not cognitively oriented sessions, gains in performance and IQ were not found.

The program, however, is in a very early stage of development and a great many problems must be explored. For example, the experimental work in this area is

meager and I cannot justify either the deficiencies or the therapeutic techniques of the basis of a well formed body of knowledge. Even if the program is shown to be useful for large numbers of children, basic issues remain such as the age at which such a program should or must be initiated, the length of time such a program must be kept up for the gains to be maintained, etc. In addition, the area of teacher training poses many problems (can all teachers be trained in this type of program? what are the most effective means of training teachers? and so on). Therefore I hope that this program is seen as just a beginning step in approaching an area of human behavior which is of great significance in both basic and applied research.

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